



# *X-Plain™*

## *Stroke Rehabilitation*

### **Reference Summary**

Strokes are very serious and can result in death or disability. Rehabilitation, physical therapy, speech therapy and occupational therapy are necessary to improve the functions of the body after a stroke.

Rehabilitation retrains the brain to think, understand, speak, move, and feel. This reference summary will help you better understand the rehabilitation options available for patients who have had strokes.

#### **Anatomy**

The brain controls most of the movement and sensations in the body. The biggest part of the brain is called the cerebrum. It is divided into 2 sections:

- the right hemisphere
- the left hemisphere



The right side of the brain controls the movement and sensation of the left side of the body. The left side controls the movement and sensation of the right side of the body.

In all right-handed people and most left-handed people, the left hemisphere of the brain controls understanding and speech. In about 25% of left-handed people, however, the *right* side of the brain

controls understanding and speech. A small section of the brain is located under the cerebrum; it is called the cerebellum and it controls balance and coordination.

The brain stem, which is the deepest part of the brain, connects the cerebrum and cerebellum to each other and to the spinal cord. The brain stem controls breathing and the rhythm of the heart. In order to work correctly, the brain needs a constant supply of oxygen. The heart continuously pumps oxygen-rich blood to the brain.

Blood travels to the brain through 4 large blood vessels:

- 2 carotid arteries
- 2 vertebral arteries

The 2 carotid arteries are located in the front part of the neck area and supply blood to the front of the cerebrum. You can feel blood pulsing through your carotid arteries if you put your finger on either side of your windpipe. The 2 vertebral arteries supply blood to the back part of the cerebrum, the cerebellum, and the brain stem. They pass through small holes in the back of the spine on their way to the brain.

#### **Symptoms & Causes**

Strokes can occur if:

- the blood supply to the brain gets interrupted
- there is bleeding in the brain, leading to brain damage

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Some strokes do not last very long and heal on their own. These are known as Transient Ischemic Attacks, or TIAs. Other strokes last for a long time and can cause permanent damage. When the blood supply to the brain gets interrupted, the area that is not receiving blood stops working. Depending on which area of the brain is affected, the patient may be unable to speak, understand, or move one side of the body.

Strokes can cause severe and permanent symptoms such as:

- affected vision
- decreased sensation
- numbness
- speech problems
- weakness



Stroke can have long-term effects on the brain called “deficits.” Severe strokes sometimes lead to death or a vegetative state.

Strokes may be caused by any of the following health conditions:

- heart problems

- cholesterol build-up in the arteries of the neck or brain
- carotid or vertebral arteries clogged with plaque
- high blood pressure, which damages blood vessels in the brain

The arteries may become clogged and inflamed due to diseases such as:

- lupus
- vasculitis
- drug abuse

Smoking and drug abuse also increase the chances of blood vessel problems and strokes.

The reason a stroke is very serious is because “neurons,” which are thinking cells of the brain, do not divide and multiply very often. Therefore, once a neuron is damaged by a stroke, it cannot fix or replace itself! Most patients do improve a little after a stroke. This is because the brain is usually able to “rewire” itself using some of its non-damaged brain areas to bypass the damaged spots.

## Rehabilitation

Rehabilitation helps improve the chances of successful recovery from a stroke. The first few days after a stroke are very critical. During this time, the brain could swell, causing even more damage to the brain. In rare cases, this could lead to death! About a week after a stroke, the patient’s condition stops changing and the deficits seen at first may tend to improve on their own.

Problems that remain after deficits have improved, such as weakness and speech problems, can be very disabling. Rehabilitation can help to restore some losses that the stroke caused.

There are 2 main goals of rehabilitation:

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- To strengthen and re-educate the patient to help him or her improve.
- To teach the patient how to manage as normal a life as possible, within the limits of his or her deficits.



Rehabilitation is a combination of 3 kinds of therapy.

Physical therapy. Strengthens muscles and improves the patient's walking skills.

Speech therapy. Re-educates the patient on everything that has to do with speech. This includes how to speak, understand, read, write, solve problems, etc.

Occupational therapy. Teaches patients different "tricks" that will help them lead as normal a life as possible.

Rehabilitation is started as soon as the patient is medically stable; this is usually a few days after the stroke. For rehabilitation to be successful, it is important for the patient and his or her family to cooperate and show enthusiasm. Even though the therapies are only scheduled a few times a week, the patient and his or her family should do therapeutic exercises on a daily basis. Even though rehabilitation has gotten much better in the last 20 to 30 years, stroke victims are still sometimes not able to get back to the way they were before the stroke. It is important to keep working on skills and not get discouraged.

## Physical Therapy

The goal of physical therapy is to strengthen muscles and improve "gait," which is walking skills. Physical therapy also helps loosen muscles and joints that may have become stiff in the arm or leg that was involved with the stroke. Exercises are given to the patient and his or her family to strengthen weak muscle groups. They should be done many times each day.

The therapist helps the patient to walk at first. Eventually, the patient uses parallel bars for assistance. As walking skills develop, the patient can use a walker or cane to get around more efficiently. The hope is that, in time, the stroke victim will be able to walk without help.

It is important to do walking exercises only while the therapist or a family member is around. Without extra people around to help, the patient could fall and break a hip or a vertebra

## Speech Therapy

A speech therapist teaches and re-educates patients about all functions that involve speech.

These functions include but are not limited to:

- speaking
- understanding
- reading
- writing
- improving memory
- solving problems
- dealing with numbers

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Speech therapy is done with the help of exercises that help reinforce these activities in the healing brain. Just like with physical therapy, it is very important to do the exercises over and over! Until a patient has fully improved, they should be supervised when balancing a checkbook or when making major decisions.

### **Occupational Therapy**

Occupational therapists help patients perform daily activities with the help of “tricks” and specially designed gadgets and devices. Occupational therapists teach patients how to dress themselves, take baths or showers, eat, shave, cook, etc. For example, occupational therapists can teach patients how to use a reacher. A reacher works like an extension of the patient’s arm; it is very helpful for picking objects up without bending. Reachers also help patients put pants on.

Occupational therapists can recommend special silverware with oversized handles to help patients eat if their hands are weak. Occupational therapists can suggest ways to change a stroke patient’s home to make it more accessible and safe.

Occupational therapists help stroke patients get fitted for braces that will improve their function. Braces also decrease the chances of severe joint stiffness. Braces can be used on the elbows, wrists, knees, or ankles.

### **Summary**

Even though strokes can be very disabling, new rehabilitation techniques give stroke survivors more of a chance to stay independent.

The success of stroke rehabilitation depends mostly on the patient and his or her immediate family. Exercises should be continued even after initial deficits have improved. This gives patients the best chance to get back to a normal life!

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